Earthquake Shaking — Green Alert

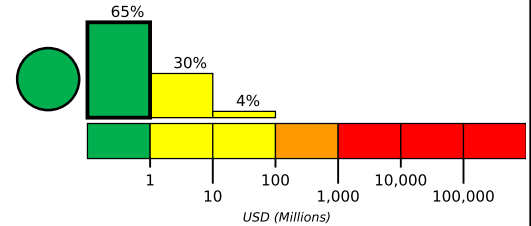GSN · USAID FROM THE AMERICAN PEOPLE · ANSS

M 4.1, 4km NW of Manhattan, Montana

Origin Time: 2019-08-06 04:27:04 UTC (Mon 22:27:04 local)
Location: 45.8804° N 111.3752° W Depth: 5.0 km

PAGER
Version 8

Created: 1 day, 0 hours after earthquake

Estimated Fatalities

65%
30%
4%

1   10   100   1,000   10,000   100,000
Fatalities

Green alert for shaking-related fatalities and economic losses. There is a low likelihood of casualties and damage.
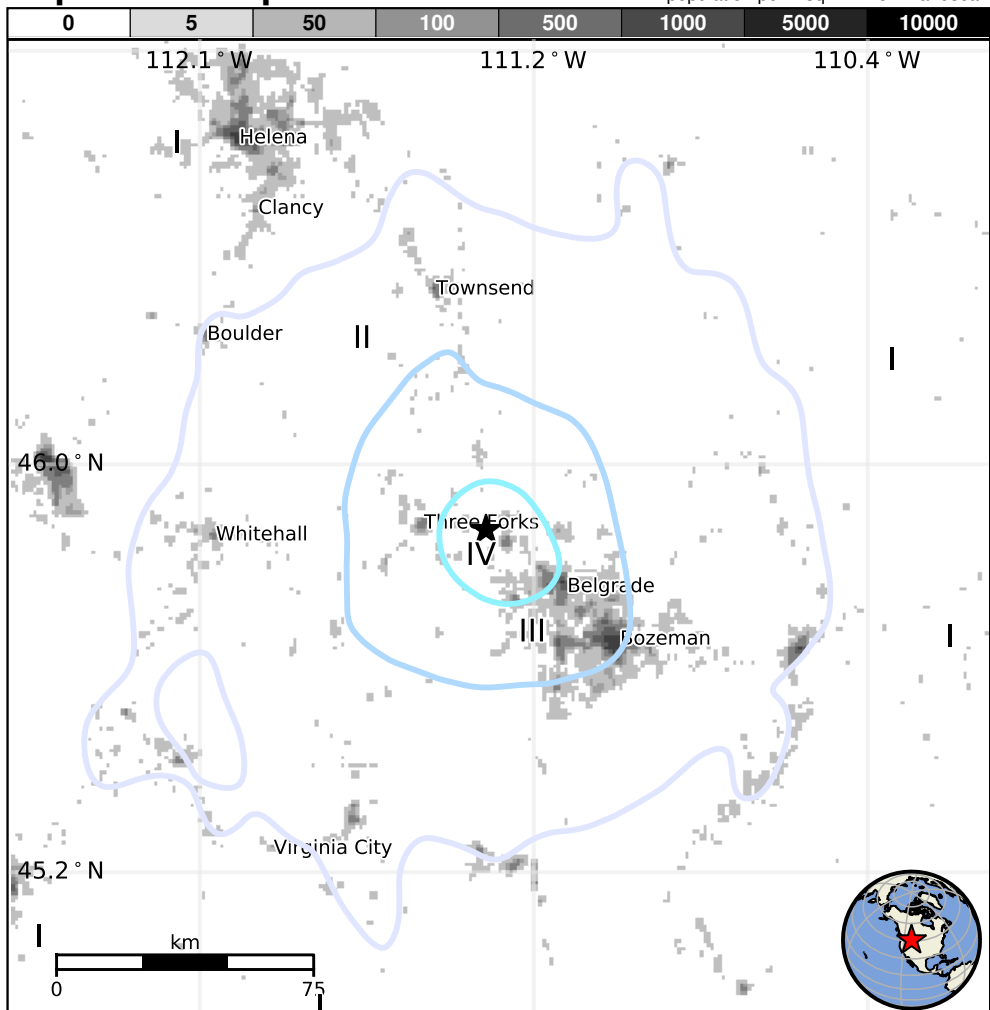
Estimated Economic Losses

65%
30%
4%

1   10   100   1,000   10,000   100,000
USD (Millions)

Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k=x1000)		101k*	146k	12k	2k	0	0	0	0	0
ESTIMATED MODIFIED MERCALLI INTENSITY		I	II-III	IV	V	VI	VII	VIII	IX	X+
PERCEIVED SHAKING		Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	Resistant Structures	None	None	None	V. Light	Light	Moderate	Mod./Heavy	Heavy	V. Heavy
	Vulnerable Structures	None	None	None	Light	Moderate	Mod./Heavy	Heavy	V. Heavy	V. Heavy

*Estimated exposure only includes population within the map area.

Population Exposure

population per 1 sq. km from Landscan

0   5   50   100   500   1000   5000   10000

Structures

Overall, the population in this region resides in structures that are resistant to earthquake shaking, though vulnerable structures exist. The predominant vulnerable building types are unreinforced brick masonry and reinforced masonry construction.

Historical Earthquakes

Date (UTC)	Dist. (km)	Mag.	Max MMI(#)	Shaking Deaths
1984-08-22	254	5.5	V(3k)	–
1994-02-03	346	5.8	VIII(1k)	–
1983-10-28	276	6.9	VII(2k)	2

Recent earthquakes in this area have caused secondary hazards such as landslides that might have contributed to losses.

Selected City Exposure

from GeoNames.org

MMI	City	Population
V	Manhattan	2k
III	**Belgrade**	**7k**
III	**Three Forks**	**2k**
III	**Bozeman**	**37k**
III	Four Corners	3k
II	**Townsend**	**2k**
II	Livingston	7k
II	Helena Valley Southeast	8k
I	Butte	34k
I	**Helena**	**28k**
I	Helena Valley West Central	8k

bold cities appear on map.   (k = x1000)

PAGER content is automatically generated, and only considers losses due to structural damage. Limitations of input data, shaking estimates, and loss models may add uncertainty.
https://earthquake.usgs.gov/earthquakes/eventpage/us6000515j#pager

Event ID: us6000515j